

Claims

1. A semiconductor package (1) comprising:

- 5 - a semiconductor chip (2) including an active surface with a plurality of chip contact areas (3),
- a package substrate (4) including a plurality of first contact areas (6) and a plurality of second contact areas (8) on its bottom surface, the chip (2) being mounted on the package substrate (4) with its active surface facing the package substrate (4),
- 10 - a plurality of conducting means (5) providing electrical contact between the chip contact areas (3) and the first contact areas (6), and
- 15 - a heat spreading means (10) comprising a planar area (11) and at least one protrusion (12), the planar area (11) being attached to the upper surface of the chip (2) and the protrusion (12) being attached to the upper surface of the package substrate (4).

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2. A semiconductor package according to claim 1 characterized in that two protrusions (12) are provided, being located on opposite sides of the chip (2).

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3. A semiconductor package according to claim 1 or claim 2 characterized in that the protrusions (12) are provided along the whole length of two opposing sides of the package substrate (4).

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4. A semiconductor package according to one of claims 1 to 3 characterized in that two opposing sides of the package (1) are open.

5. A semiconductor package according to one of claims 1 to 4 characterized in that open-ended air tunnels (17) extending from one side to the 5 opposing side of the package (1) are formed between the chip (2), the heat spreading means (10) and the package substrate (4).

10 6. A semiconductor package according to one of claims 1 to 5 characterized in that the heat spreading means (10) is attached to the chip (2) by thermally conductive adhesive means (15) and to the package substrate (4) by non-conductive adhesive means (16).

15 7. A semiconductor package according to one of claims 1 to 6 characterized in that the chip (2) is mounted to a redistribution board (4) using the flip-chip technique.

20 8. A semiconductor package according to one of claims 1 to 7 characterized in that the surfaces of the heat spreading means (10, 19) are at least in part black.

25 9. A method to assemble a semiconductor package (1) comprising the following steps:
- Providing a module heat spreading means (19) comprising:
- a plurality of sawing grooves (18, 24) on its upper surface, and
- a plurality of grooves (14) and protrusions (25) in its bottom surface,

- Attaching thermally conductive adhesive means (15) to the grooves (14) and non-conductive adhesive means (16) to the protrusions (25) of the module heat spreading means (19),
- 5 - Providing a substrate (20) comprising a matrix of package sites (21) arranged in an array each including a chip (2) and a package substrate (4),
- Positioning the module heat spreading means (19) on the substrate (20) so that the protrusions (25) are in contact with the package substrates (4) of the substrate (20) and the groove (14) is connected to the upper passive surface of the chip (2),
- 10 - Curing the adhesive means,
- attaching a plurality of external contact means (9) to the contact areas (8) on the bottom surface of the package substrates (4) of the substrate (20),
- Singulating the individual semiconductor packages (1) by using the sawing grooves (18, 24) in the upper surface of the module heat spreading means (19) to guide
- 15 the path of the saw blade.
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10. A method to assemble a semiconductor package (1) characterized in that the plurality of chips (2) are mounted using the flip-chip technique to a redistribution board (4) at each package site (21).

Reference Numbers

- 1 semiconductor package
- 2 semiconductor chip
- 5 3 contact areas on chip
- 4 re-distribution board
- 5 microscopic solder balls
- 6 contact areas on re-distribution board
- 7 epoxy
- 10 8 external contact areas
- 9 macroscopic solder balls
- 10 heat spreader
- 11 flat plate of heat spreader
- 12 protruding bar of heat spreader
- 15 13 chamfered edge
- 14 groove
- 15 thermally conductive adhesive
- 16 non-conducting adhesive
- 17 open ended tunnels
- 20 18 longitudinal V-shaped sawing groove
- 19 matrix-sized heat spreading module
- 20 substrate
- 21 package site
- 22 package demarcation lines
- 25 23 rectangular metal sheet
- 24 lateral V-shaped sawing groove
- 25 protruding bar of matrix-sized heat spreading module 19